

# NATURAL ENVIRONMENT WORKSHOP HIGHLIGHTS SEVERE CLIMATE TESTING

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A Heavy Equipment Transporter (HET), a huge vehicle capable of hauling a 70-ton payload, recently strained through the blowing snow and ice of Alaska's Cold Regions Test Center (CRTC) on a wilderness road course. The HET's braking ability gradually diminished as snow, kicked up by the wheels, entered the brakes through the open brake assemblies. Eventually, the brakes froze entirely.

Though the transporter had undergone a gamut of tests in the lower 48 states before being sent to Alaska, this problem had never before been encountered. The problem was eventually solved by the installation of metal-backing plates to prevent snow from entering the brake drums; however, this event dramatically demonstrates why natural environment testing is so important. Environmental chambers, though they have their place, did not prove adequate in thoroughly and reliably testing the HET's system.

As stated by Bob Torp, CRTC Technical Director, "Wars are not fought in cold chambers."

The Army Test and Evaluation Command held a 2-day natural environment testing workshop in Baltimore, MD, late last year to discuss the Army's declining natural environment testing workload. The first day was devoted to various speakers, and the second day centered on small working groups. The groups were so successful and generated such intense discussion that several had to be reminded to break for lunch.

Attended by more than 130 testers and equipment developers, the workshop highlighted the importance of

natural environment testing as part of the testing "mix" of each weapon system. Experts recognize four natural environments as important in military equipment and munitions testing: desert, cold weather, tropic, and temperate. Of these, the first three are under the management of the U.S. Army Yuma Proving Ground (YPG).

"You don't get a second chance when equipment fails on the battlefield. Soldiers depend on us to get it right," stated Army Acquisition Corps Director LTG Paul J. Kern during his keynote address at the outset of the workshop.

He explained that testing must consist of a combination of three things: modeling and simulation (M&S), chamber testing, and natural environment testing. Each has its appropriate place in the weapon sys-

tem and munitions development process, he said.

According to BG Dean Ertwine, Commander of the Developmental Test Command, there is no question that the Army's environmental test capacity has declined in recent years as funding levels have been reduced. However, with the increasing use and reliance on less expensive chamber and M&S testing by Army equipment developers comes an element of risk.

"The Army has been faced with declining resources throughout the acquisition world," said Ertwine. "Project managers across the board have been faced with decisions that have all too often forced them to cut something. Natural environment testing has been sliced too much, in my opinion."

Warfare statistics gleaned from the last half-century provide sobering food for thought. Nearly 75 percent of all armed conflicts throughout the world occurred in cold, desert, or tropic environments. Weapon system and munitions testing was extremely spotty prior to World War II, with many problems surfacing there and in later conflicts in Korea and Vietnam. Though the Army's natural environment test capability was built up to a fairly robust state in the 1950s, '60s, and '70s, the last 10 years have witnessed a slow decline. Many experts are concerned that systems provided to soldiers today will not perform properly if not tested in severe natural environments. Historically, this type of testing has brought about many equipment "fixes" that have reduced risks to American soldiers around the world.

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—LTG Paul J. Kern  
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COL W.C. King is a physical scientist assigned to the U.S. Military Academy who has devoted his professional life to the study of environmental extremes. His focus for the last 2 years has been specifically on the tropic environment, as the Army attempted to relocate its natural environment test facilities from Panama to other areas.

"Our tropic testing challenge today is to evolve from the excellent testing facilities the Army once enjoyed in Panama to the Army needs of today in less than perfect tropic testing conditions," stated King. "Schofield Barracks in Hawaii has some very attractive testing locations, with troop availability and a firing capacity. We will need to travel to other tropic areas, however, for specific missions."

Some developers maintain that Florida or Louisiana offer the conditions necessary for tropic testing, a contention King dismisses. "Those areas don't have the constancy of heat and humidity available elsewhere," he maintained. "The scientific criteria for a tropic area just don't exist in the continental United States. The tropics are defined by a belt around the equator."

King says military planners must look ahead and be prepared to face the conflicts in which American forces are most likely to be involved in future years. He says small conflicts over resource scarcities appear likely, as in Somalia and Ethiopia right now. These conflicts involve a clash of cultures, but the regions also feature dramatic deforestation, lack of water, overpopulation, and overburdened infrastructure. As people relocate from one area to another, they meet resistance from people already inhabiting the new territory. Tempers flare and hostilities result.

"The Army is creating small, agile forces to meet the uncertainties of the future," explained King. "These missions may involve patrolling after a disaster or peacekeeping activities, but we have to be ready."

King is a believer in the value of testing weapon systems and munitions in the natural environment. "No piece of equipment is fully ready to field until it is given to the soldier and tested for use in harsh conditions," he stated.

"Environmental chambers and modeling and simulation are important parts of the testing process, but they cannot simulate a soldier actually using a piece of equipment. There is no way to manage all the synergies involved. In my opinion, removing soldiers from the developmental testing process is risky."

Lance VanderZyl, Acting Director of the Tropic Regions Test Center, shared a number of significant points about the tropic environment. "The jungle canopy loves to absorb radio frequency signals, which, naturally, is a circumstance that significantly impacts communications," he explained.

"Because of the tangled undergrowth and rugged nature of typical tropic terrain, accurately navigating along the ground takes experience. Sound waves are also different in dense jungle—it's tough to distinguish precisely where sounds come from. In short, the tropic environment is a super-challenging environment that tests military systems to the fullest extent possible."

LTC Michelle Stoleson, Commander of YPG's Materiel Test Center and a featured workshop speaker, described the desert environmental testing being conducted at the southwest Arizona installation. Although people typically identify YPG solely with desert testing, she pointed out that the general-purpose proving ground is responsible for a wide range of severe environment testing—desert, cold, and tropic.

"The Materiel Test Center's role is to provide testing services for nearly every item of ground combat equipment," Stoleson explained. "Yuma testing takes place in a desert environment on an installation that is over 840,000 acres in size, so it's a great place for developers to conduct realistic, sophisticated testing on a very wide variety of equipment. Many tests take place at the same time in different parts of the proving ground."

According to Stoleson, desert testing typically takes place in one of three ways. The first is that a solid test plan is developed that incorporates complete desert testing, such as with the M1 Abrams Main Battle Tank or the Bradley Fighting Vehicle. The second is

when the test center conducts a general test on a developed item, but in Yuma's severe natural environment. In this case, desert testing is a bonus for the developer. The final is when a last-minute requirement for desert testing takes place, as was frequently the case during the 1991 Persian Gulf War. As an example, Stoleson cited a quick fix made to a blade wear problem aboard the AH-1 Apache helicopter caused by the dust and grit of the desert environment.

COL James Althouse, Commander of YPG, says the workshop showed that the Army Test and Evaluation Command is taking a very serious look at environmental testing issues. He added, "We have to be prepared to fight anywhere in the world, so the Army cannot ignore extreme environmental tests. Modeling and simulation can be used, but this doesn't eliminate the need for actual natural environment testing. It's just one of the tools in the testing mix."

BG Ertwine summed up the workshop's goal when he addressed the attendees at the conclusion of the final session. He said that when the balloon goes up and a soldier is sent to some forsaken place, we must be able to look his or her parents in the eye and say we've done everything we could to ensure that the equipment worked exactly as it should.

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